NCST Investigation of the Champlain Towers South Collapse

Collection of Additional Evidence

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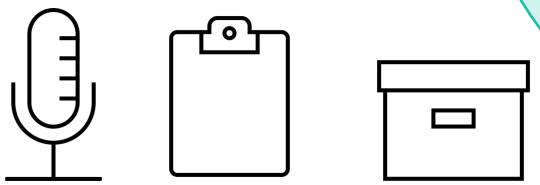
How can Additional Evidence Help the Investigation?

- Interactions across 40+ years
  - Building's design
  - Construction
  - Maintenance
  - Failure
  - Response
  - Recovery

What Additional Evidence are we Collecting?

SOCIAL SCIENCE
- Interviews
- Focus Groups
- Surveys
- Field Notes



ARCHIVAL/DOCUMENT SEARCH
- Newspaper Articles
- Social Media Posts
- Audio Recordings (e.g., 911 Calls, Police Body Cameras)
- Building Drawings
- Building Codes
- Permit Applications
- Inspection Reports
- Legal Documents
- Public Meeting Minutes
- Emergency Declarations
- After Action Reports

REMOTELY SENSED
- Maps
- Images
- Videos
- Lidar Data
- Satellite Data
- 3D Scans of Physical Evidence

How can Social Science Help the Investigation?

PRIMARY ROLE

- Risk Communication/Evacuation Procedures
- Search and Rescue Activities
- Collapse Material Removal/ Recovery
- Public Opinion
  - Building Safety Perception
  - Support for Different Building Safety Policies

SUPPORTIVE ROLE

- Hypotheses Development, Affirmation or Rejection
  - Initial Failure/Progression of the Collapse
- Uncertainties
- Contextual Understanding
  - Changes Made to the Building Over Time
  - “How” and “Why”

How can Social Science Help the Investigation?

INTERVIEWS: Provides detailed, targeted information from diverse stakeholders
- Eyewitnesses, residents, first responders, experts, elected and appointed officials

FOCUS GROUPS: Trigger a memory; support, challenge or confirm prior findings
- CTS residents, first responders, and subject matter experts

SURVEYS: Understand public opinion
- Residents of multi-story structures in the U.S., condo association officials, building inspection officials

OBSERVATIONS: Provides a more authentic and holistic understanding
- Court hearings

ARCHIVAL/DOCUMENT SEARCH: Helps understand context
- 911 call transcriptions, building codes, inspection reports

Coordination with other Investigation Projects

Before an Interview

- Request for a list of interviewees/groups of interest
- Check for interest in co-conducting an interview
- Co-production of interview questions
- Co-production of codes for analysis

During an Interview

- Co-conducting of the interview

After an Interview

- Automated transcription of the interview
- Manual checking of the transcription for accuracy
- Identification of parts to be coded by two researchers
- Double coding and analysis of identified text
- Reporting of findings to the larger team

Ensuring Accuracy of Information in Social Science Evidence

- Techniques That Increase Correct Information Retrieval (e.g., Cognitive Interviewing)
- Line of Sight
- Maps, Plans, Photos, and Videos as Props and Stimuli
- Multiple Data Collection Methods, Datasets, and/or Investigators
- Natural Language Processing Techniques

How do we Prioritize Social Science Evidence Collection?

Priority I: Initial Failure/Progression of the Collapse

- CTS residents, relatives, staff, condo officials, contractors, inspectors and consultants
- Other eyewitnesses of the collapse
- Those who might be familiar with construction and inspection practices in 1981
- Anything that is deemed critical for the failure hypotheses

Priority II: Response

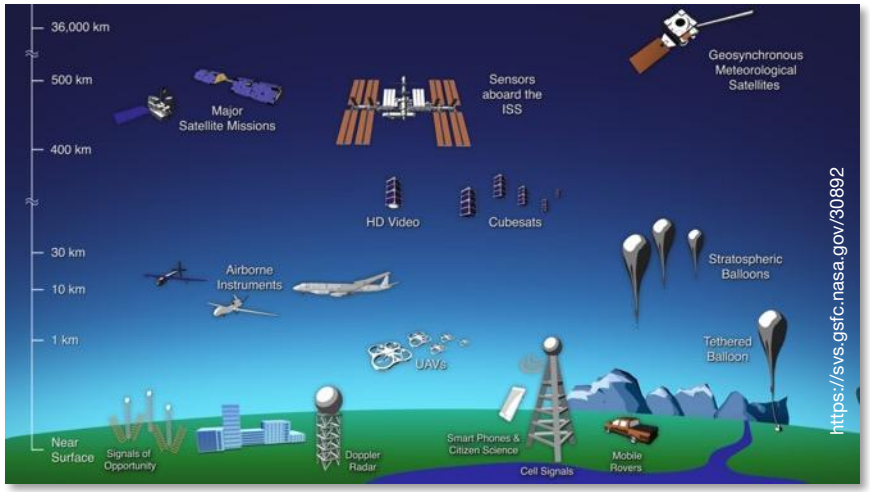
- CTN and CTE residents
- First responders, others involved in response and rescue

Priority III: Policy Recommendations

- Residents of condo structures in the U.S.
- Government officials & subject matter experts (e.g., structural engineers)

What is Remotely-Sensed Evidence?

- **"Remote sensing** is the acquisition of information about an object or phenomenon without making physical contact with the object" (https://en.wikipedia.org/wiki/Remote_sensing)
- Traditionally applied to long-range sensing
- Also applied to short-range sensing
- We include photos and videos in our definition of remotely-sensed evidence since they are captured without contact



Images and Videos
(historical and from the response)

How it helps

Provide unique perspectives from outside and inside the building before, during, and after the collapse

Accomplished

Collected information from many sources

Identified and analyzed some of the information

Focus

Develop data management tools

Process and analyze high-priority data

Plans

Tagging and cataloging

Source: 2021, Adriana Sarmiento

Source: 2020, Fiorella Terenzi

Time-lapse Videos
(from the response)

How it helps

Track initial locations of structural elements and how they were tagged and removed

Provide condensed record of the response activities

Accomplished

Used to locate elements of interest over time

Focus

Use as needed

Plans

Incorporate into data management tools

Drone Images and Videos
(historical and from the response)

How it helps

Track evidence locations when found and over time

Detailed views not easily obtained from the ground

Find evidence that may not have been collected

Accomplished

Cataloged and organized data

Used to locate elements of interest over time

Focus

Tag and reprocess some of the generated maps

Plans

Incorporate into data management tools

Commercial & Home Security Camera Videos

How it helps

Understand the collapse timing, sequence, and motions

Understand the initial response

Accomplished

Collected high-resolution version of some videos

Collected calibration data for 87 Park camera

Analyzed for timeline

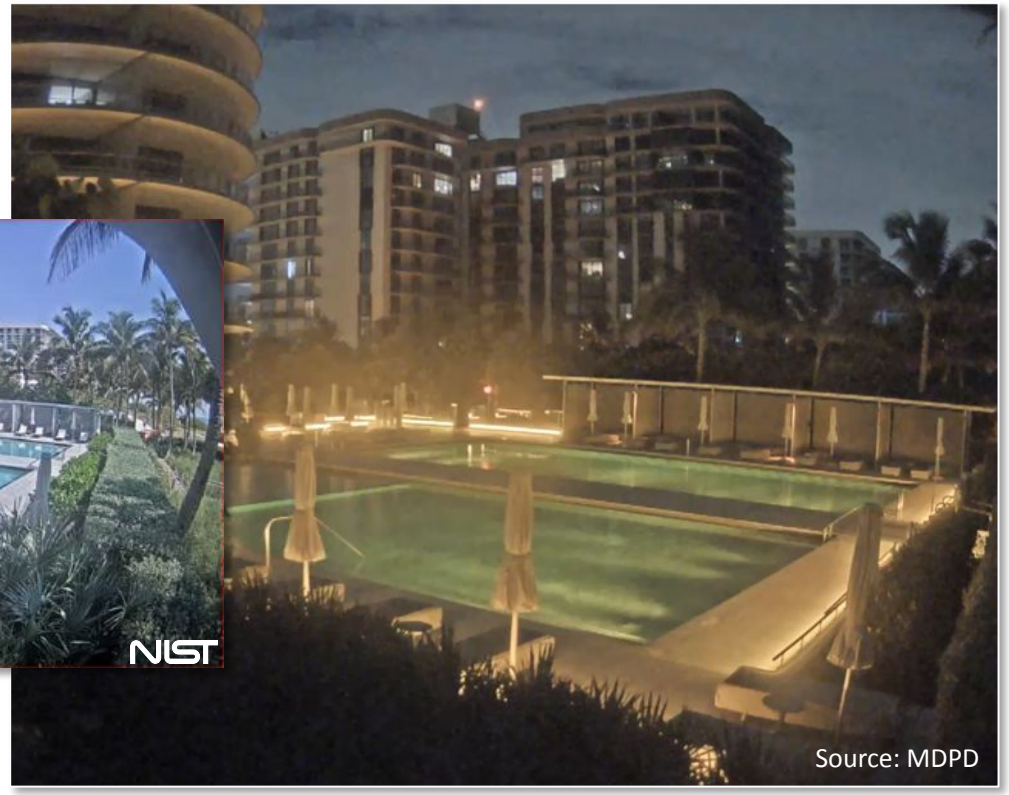
Focus

Enhance and analyze

Obtain remaining videos

Plans

Use to provide spatial and temporal measurements



LiDAR Data

(airborne, mobile, and terrestrial - historical and from the response)

How it helps

Allow coarse measurements of locations, dimensions, movements, and alignments of objects at the site over time

Accomplished

Processed and aligned > 50% of scans collected during the response

Identified (and acquired some) historical LiDAR data

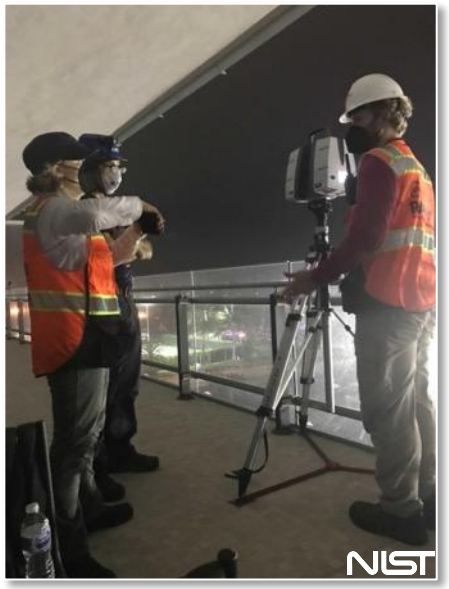
Focus

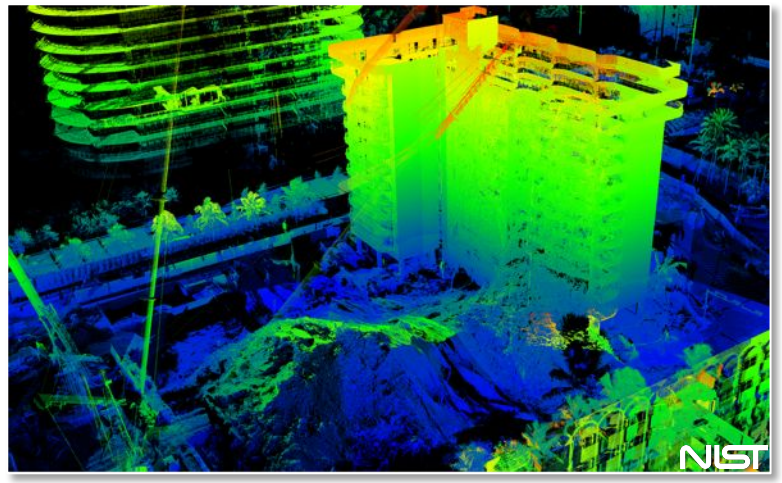
Process all scans from the response

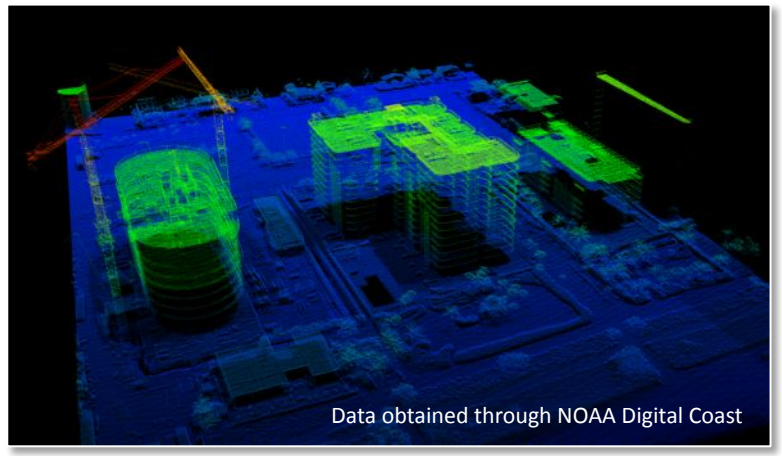
Acquire remaining data

Plans

Process new data and implement tools to make all scans easily accessible







Interferometric Synthetic Aperture Radar - inSAR

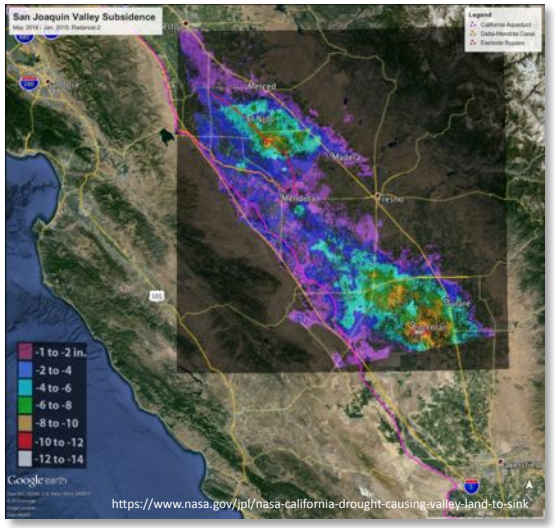
(satellite data collected before and after the collapse)

How it helps

Insight into any movement of the ground, the building, or the surroundings over time

Accomplished

Identified data and contractors that can provide and analyze the data

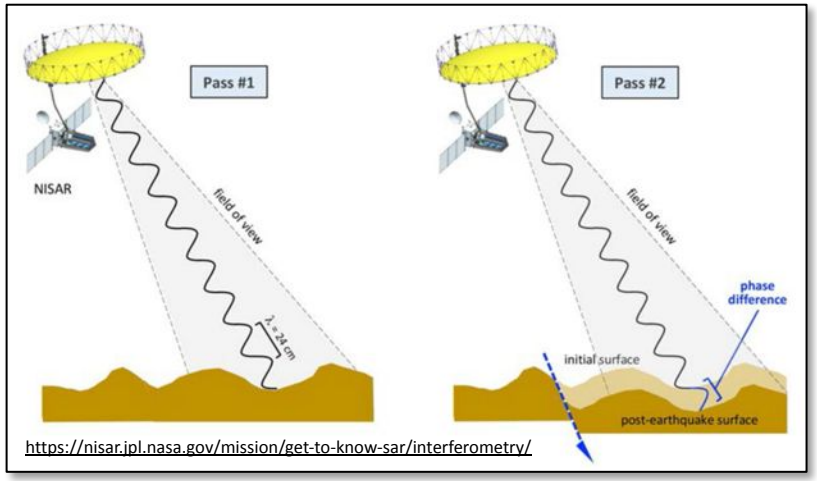


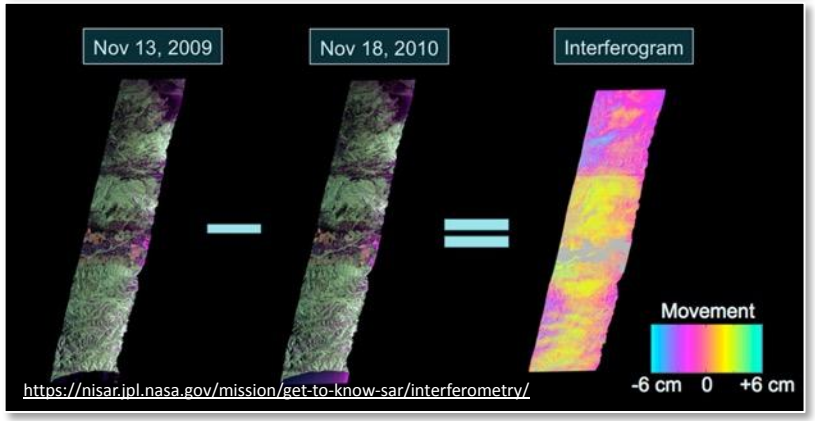
Focus

Develop documents for procuring the data

Plans

Work with contractor on interpretation of the results





3D Scans of the Structural Evidence

(coarse and fine scans of the structural specimens)

How it helps

Allow precise measurements of the conditions and dimensions of specimens after collapse

Record locations of specimens in warehouse and provide virtual access

Accomplished

Scanned and mapped evidence in warehouses

Developed specimen-scanning workflow

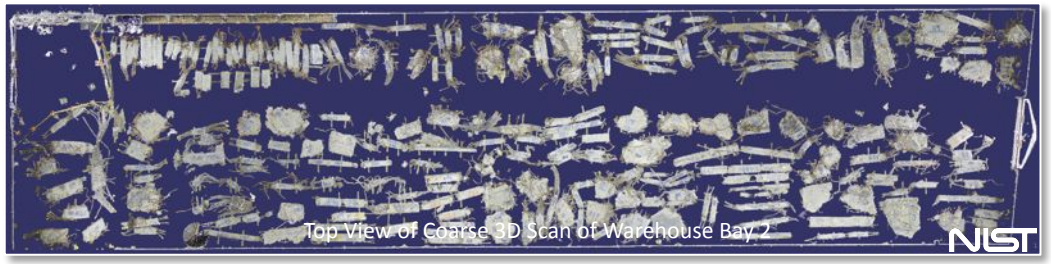
~30% of structural specimens scanned

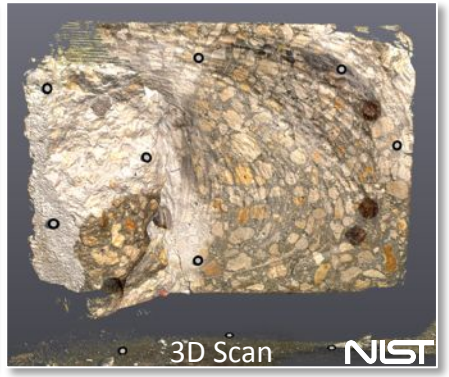
Focus

Organize and process the detailed scans, make them easily accessible

Plans

Continue scanning specimens





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